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SUFFOLK COUNTY, August 14, 1984

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

DOCKETED
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Before the Atomic Safety and Licensing Board

OFFICE OF SECRETARY
SUFFOLK COUNTY

_____)
In the Matter of)
)
LONG ISLAND LIGHTING COMPANY)
)
(Shoreham Nuclear Power Station,)
Unit 1))
_____)

Docket No. 50-322-OL

SUFFOLK COUNTY'S OPPOSITION TO LILCO'S MOTION
TO STRIKE PORTIONS OF THE JOINT DIRECT
TESTIMONY OF DR. ROBERT N. ANDERSON, ET AL.

For the reasons stated below, Suffolk County opposes LILCO's August 7 Motion to strike portions of the joint direct testimony filed by the County on July 31 ("Testimony"), and LILCO's Motion should be denied in its entirety. The County will respond on a point-by-point basis to each of the general and specific objections raised by LILCO.

I. "OVERVIEW" RESPONSES

1. LILCO baldly claims that the County's Testimony often is beyond the scope of the admitted contentions. LILCO Motion at 1, 2, passim. This broad general claim will be refuted with

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specificity below (in part II) as to each portion of the Testimony which LILCO seeks to strike. The Testimony directly relates to the four components in issue in this proceeding. A few brief portions provide the Board with minimal relevant background information, which the Board specifically recognized could be relevant and admissible (Tr. 21,835), and provides the foundation for portions of the testimony evaluating LILCO's assertions that the four major components in the EDGs have been adequately designed and manufactured to overcome the deficiencies that plagued the original components.

2. Paragraph 2 of LILCO's Motion argues that some portions of the Testimony are unfounded and have no "nexus" to the Shoreham EDGs. This is another vague claim and sets up an incorrect standard for the admissibility of testimony. The admissibility of testimony depends upon it being relevant to the admitted contentions, material, and reliable, as required by 10 C.F.R. § 2.743(c). The Testimony meets these criteria, as will be demonstrated in the responses to LILCO's specific objections.

3. LILCO also objects generally that portions of the Testimony are not supported by calculations or data and are therefore purely speculative. LILCO's claim ignores the

difference between the standards for the admissibility of expert testimony and matters to be brought out on cross-examination. LILCO also conveniently ignores the Federal Rules of Evidence which, although not specifically applicable, provide guidance to Licensing Boards.

First, LILCO's assertion that the County's experts fail to state the facts or data underlying their opinions is incorrect. All of the opinion testimony is given by the County's experts who are qualified by education and experience and is accompanied by an explanation of the facts and analysis underlying that opinion. In any case, LILCO's insistence that detailed facts or data supporting an opinion are required for admissibility is contradicted by Rule 705 of the Federal Rules of Evidence. Rule 705 states: "The expert may testify in terms of opinion or inference and give his reasons therefor without prior disclosure of the underlying facts or data, unless the Court requires otherwise. The experts may in any event be required to disclose the underlying facts or data on cross-examination." (Emphasis added). As suggested by Rule 705, if LILCO believes that the County's experts have formulated their opinions without sufficient factual foundation, or upon erroneous facts, that is something to be resolved by cross-examination.^{1/}

^{1/} Cf. Smith v. Ford Motor Co., 626 F.2d 784, 793 (10th Cir. 1980) ("The combined effect of these new [Federal] rules

(Footnote cont'd next page)

To the extent that LILCO argues that the County's experts must cite the scientific or technical authorities for their opinions, its argument is without legal or regulatory support or authority.^{2/} Any concerns that LILCO may have in this area are resolved by its right to cross-examine the County's experts on the technical or scientific foundation for their opinions.

4. LILCO claims that "the County's experts have not established that they are qualified to testify" as to certain matters. LILCO Motion at 5-6. First, LILCO apparently has not read the first ten pages of the Testimony or Attachments 1-6 thereto, which provide the extensive expert qualifications of the County's witnesses. The County's more specific identification of each witness's testimony presumably will enable LILCO to object more precisely to qualification. Second, LILCO specifically attacks the expertise of the County's witnesses in

(Footnote cont'd from previous page)

[of Evidence] is to 'place the full burden of exploration of the facts and assumptions underlying the testimony of an expert witness squarely on the shoulders of opposing counsel's cross-examination.'"); Bryan v. John Bean Div. of FMC Corp., 566 F. 2d 541, 545 (5th Cir. 1978) ("[R]ule 705 shifts to the cross-examiner the burden of eliciting the bases of an expert witness's opinion . . .").

^{2/} It is pertinent that LILCO cites no authority on this point.

the field of finite element analysis, without citing any authority or facts to support its assertion. In each instance where LILCO attacks expert testimony as being unqualified, that testimony states an opinion that one or more of the County's experts is plainly qualified by education and experience to give.

5. LILCO's objections to the County's use of portions of deposition testimony of non-parties (LILCO Motion at 6-7, passim) are specious. LILCO completely ignores 10 C.F.R. § 2.740a(g), which expressly permits a party to introduce into evidence portions of depositions without limiting the admissibility of such testimony, and allows any other party to introduce other parts of the depositions. Even if the more stringent provisions of Rule 32(a) of the Federal Rules of Civil Procedure are applied, the portions of the deposition testimony in question would be admissible because the non-party deponents are located farther than 100 miles from the place of trial. Fed. R. Civ. P. 32(a)(3)(B). See also Fed. R. Civ. P. 32(a)(1); Fed. R. Evid. 801(d)(2). All of the TDI deponents (Messrs. Trussell, Dobrec, Lowery and Mathews) are located in California, and Mr. Foster of Region IV of the NRC is in Texas; all are well over 100 miles from the place of trial. Similarly, as LILCO well knows, Messrs. Harris, Johnston, Chen,

Pischinger, Taylor and Wells all reside well beyond 100 miles from Long Island. Furthermore, contrary to LILCO's assertion (LILCO Motion at 7), the County is not required to demonstrate that the deponents are unavailable to testify at trial. See, e.g., Houser v. Snap-On Tools Corp., 202 F. Supp. 181, 189 (D.Md. 1962); SEC v. American Realty Trust, 429 F. Supp. 1148, 1178 & n.27 (E.D. Va. 1977).

Although the ABS deponents may not be over 100 miles from the place of trial, the portions of their deposition should be admitted without requiring their appearance at the hearing as witnesses. LILCO clearly intends to rely on the ABS approval of the replacement crankshafts (LILCO Motion at 29) and has voiced no particular objection to any specific portion of the ABS deposition. Requiring the County to subpoena the ABS deponents as witnesses would needlessly waste the time and finances of the parties and the ABS. The ABS deponents were represented at their deposition by counsel for ABS, and counsel for LILCO and TDI were also present at the deposition. Counsel for LILCO conducted redirect examination of these deponents.

In accordance with 10 CFR § 2.743(c), the County introduced into evidence only those portions of depositions that are relevant to its direct case, and excluded portions which it

believed to be immaterial or irrelevant. If LILCO believes that other portions of those depositions also should be introduced into evidence, 10 CFR § 2.740a(g) and Fed. R. Civ. P. 32(a)(4) permit LILCO to demonstrate why those other portions ought in fairness to be considered with the portions already introduced. See also Fed. R. Evid. 106. LILCO has utterly failed to make such a showing here.

Finally, LILCO is free to call as witnesses any or all of the deponents quoted by the County. The County chose not to do so for a number of reasons, including (1) that all except Mr. Foster and the ABS deponents are employed by Transamerica Delaval, Inc., LILCO, or LILCO's consultant, Failure Analysis Associates, and hence would be hostile witnesses, and (2) to save time and expense. All of the deponents were examined in the presence of counsel for LILCO and counsel for TDI; all of these counsel took an active role in making objections and defending the deponents. LILCO has previously noted that it will call Messrs. Chen, Pischinger, Wells and Museler as witnesses at the hearing.

6. LILCO's objection regarding the TDI Owners' Group Program Plan and the Phase I and Phase II reports is vague and incomprehensible. The discussion of these matters in the

Testimony is relevant and material to the admitted contentions. LILCO fails to specify in what respects these matters are not relevant and material. While LILCO has suggested that if any portions of depositions are admitted, the entire deposition must be supplied (whether or not relevant) (LILCO Motion at 7), here LILCO insists that the complete DRQR reports on particular components at issue should not be admitted. The County believes that these reports are relevant and material in their entirety. If LILCO believes that portions must be stricken, it must specify which particular portions of these reports are not relevant or material and explain why they are not.

7. LILCO generally objects to the admissibility of the entire FaAA reports on cylinder blocks, cylinder heads and pistons and asserts that the reports should be admitted only to the extent that they relate to the issues in litigation. LILCO Motion at 7, 13, 16, 22, 30. The Testimony challenges the conclusions of these three reports, which are directly relevant to the EDG contentions and which are relied upon by LILCO. The County, therefore, believes that the entire reports, which state the bases for FaAA's conclusions, are relevant and material. If LILCO disagrees, it must specify the particular portions of each report it asserts to be irrelevant and immaterial and give its reasons for its position.

8. Contrary to LILCO's claims (LILCO Motion at 8,30), the County's references to the Task Descriptions are relevant to the reliability of the EDGs and the four major components at issue. The Testimony asserts that the FaAA reports are not satisfactory design reviews because, among other reasons, FaAA failed to address functional attributes listed in the Task Descriptions. Testimony at 54, 56-57, 74, 147-48. Those functional attributes were identified by FaAA and the Owners' Group as attributes which a complete design review and failure analysis of the EDGs had to address in order to ensure their reliable operation. The failure to address most of these attributes raises serious questions about the completeness and accuracy of the conclusions drawn by FaAA. As the foundation testimony at pages 12-13 establishes, one of LILCO's principal responses to deficiencies in EDG components was the design review portion of the DRQR, which utilized the Task Descriptions. As the County's contention and its Testimony directly challenge FaAA's conclusions on the adequacy and reliability of the EDGs, the testimony concerning the Task Descriptions is directly relevant to the reliability of the EDGs.

II. RESPONSES TO SPECIFIC OBJECTIONS

A. Preliminary Matters (Testimony 1-25)

1. LILCO claims that the final question and answer and accompanying footnote on page 12 concern matters outside the scope of the admitted contention. LILCO Motion at 8-9. That testimony, however, is merely minimal background information designed to provide the Board with a complete administrative record as to the problems which gave rise to this litigation. It provides the foundation for later testimony concerning LILCO's attempts to demonstrate that problems with the EDGs (and specifically for the four major components) have been solved. Although, as LILCO correctly notes (id. at 9), the Board specifically declined to admit a contention concerning "other components," LILCO incorrectly states that the Board precluded the admissibility of evidence establishing the context which gave rise to this litigation. See, e.g., Tr. 21,835 and 21,845.^{3/} LILCO's claim is based on its fallacious

^{3/} As support for its assertion that the Board ruled on the admissibility of evidence relating to "other components" LILCO cites Tr. 21,691-98. The cited pages, however, concern the County's proposed contention on the original crankshaft (see Tr. 21,690), and not a contention on "other components." In fact, the Board specifically stated that it would permit the admission of evidence on the original crankshaft where relevant to the admitted contentions. Tr. 21,697-98.

assumption that the Board's refusal to admit a particular contention means automatically that evidence relating to the subject matter of that proffered contention is inadmissible. To the contrary, the Board has indicated that the rejection of a contention specifically does not exclude testimony on the same subject matter, if relevant to the admitted contentions. See, for example, the Board's rulings on testimony on the original crankshafts (Tr. 21,697-98), instances of other cracked cylinder blocks (Tr. 21,753-54), pre-1981 cylinder heads (Tr. 21,765), and cracking of the AF piston skirts (Tr. 21,801-02). The proffered testimony is relevant to the contentions that were admitted by the Board.

2. LILCO's objections to the County's testimony on pages 13 and 14 are substantially the same as stated in paragraph 1 above and must be rejected for the same reasons given there. The reference to the issuance and content of the Owners' Group Program Plan is not an attempt to raise an independent litigable issue as to how the Program Plan was executed, as LILCO erroneously suggests (LILCO Motion at 10), but merely is background information showing how LILCO attempted to solve the problems that gave rise to this litigation. Furthermore, this testimony provides foundation as to how LILCO attempted to prove the reliability of the four components at issue. Tr.

21,871. The second question and answer on pages 13 and 14 clearly summarize the County's position that the Owners' Group program, including the DRQR and FaAA reports, has failed to solve the problems of the EDGs, as the Testimony elaborates upon later.

3. LILCO objects to the second question and answer on page 17 and continuing to page 18 of the Testimony. This testimony concerns LILCO's proposal to reduce the maximum load on the EDGs. LILCO claims that this testimony is speculative and conjectural because the probability of the occurrence of the stated sequence of events is not identified and because the testimony allegedly provides no support for the conclusion that LILCO's proposal would further reduce the margin of confidence intended to be supplied by the current EDG rating. In fact, the testimony provides an analysis of why LILCO's proposed reduction in loading is non-conservative and should not affect the requirements for EDG reliability. It is LILCO, not the County, which has the burden of proving EDG reliability. Testimony of the County's witnesses need not prove that something will necessarily go wrong with the EDGs, in order to be admissible. Evidence which raises significant questions about EDG reliability is relevant and material to the admitted contentions, and has probative value. In any case, as previously

stated, the expert opinions of the County's witnesses need not include all of the facts or data underlying those opinions in order for those opinions to be admitted into evidence. If LILCO wishes, it may inquire into the factual support for the conclusions on cross-examination.

LILCO also incorrectly claims that the reference on page 18 to the usual practice for rating diesel engines in non-nuclear applications is excluded by the Board's July 5 ruling. LILCO Motion at 11. LILCO, however, does not cite any particular ruling of the Board and, in fact, the Board made no such ruling. The NRC's regulations do not specify precise design or rating criteria for diesel engines. Absent such criteria, the NRC must look to practices in the industry. Here, this testimony is direct, relevant evidence as to how the over-rated Shoreham EDGs, which are identical in design and manufacture to TDI diesels in non-nuclear applications in all relevant respects, should be rated. It is part of the testimony which explains what is meant by reference in the County's contention to the over-rating of the EDGs, as shown by defects in the specific four components.

4. LILCO's objections to page 18 to 25 of the Testimony, concerning the over-rating and undersizing of the EDGs, suffer

from the same confusion. LILCO Motion at 11-12. Although the Board did not admit the County's proposed general contention that the EDGs are over-rated and undersized, the Board specifically contemplated the admissibility of evidence showing that the EDGs are over-rated and undersized because the replacement crankshafts, AE pistons, cylinder blocks and cylinder heads are inadequately designed. Tr. 21,891. The testimony on pages 18 to 25 explains how diesel engines are usually rated, how TDI rated the EDGs, whether the EDGs were properly rated, what is meant by the terms "over-rated" and "undersized", how the failures of the four components in issue evidenced over-rating, what LILCO did to replace major components, and how it attempted to requalify the modified EDGs. The testimony is a necessary precursor to the detailed discussion of the four subparagraphs of the County's contention, because it defines the County's contention, provides a foundation, and discusses the appropriate standards for EDG reliability under GDC 17. Hence, all of this testimony is relevant and material to the EDG contention.

LILCO also objects to this testimony on the grounds that it is unsupported, speculative and unreliable because there is no "independent support" for the opinions of the County's experts. LILCO Motion at 12-13. This objection is vague,

imprecise and without merit. There is no requirement that expert testimony be independently supported, nor, as discussed above, that every detail for an opinion be supplied. The testimony is soundly based on the knowledge and experience of the County's witnesses. LILCO incorrectly asserts that the County's witnesses improperly rely for their opinions only on the deposition testimony of non-party witnesses. In fact, that deposition testimony is properly referred to with respect to factual matters, except for Dr. Chen's opinion (at pp. 19-20), which is clearly relevant. The deposition testimony is admissible for the reasons discussed above. It is accepted practice for experts to proffer opinions on the basis of facts which are not the product of first-hand observation. See Fed. R. Evid. 703.

5. LILCO objects to the references on pages 18 through 25 of the testimony to "extensive cracking of components" as beyond the scope of the admitted contention, because it allegedly fails to specify a relationship to the four specific components at issue. LILCO Motion at 13. This broad and vague objection fails to state with precision where that phrase appears and why it is irrelevant in the context used. Where used on page 22 of the Testimony, it is clearly introductory and provides foundation to the failures of the four major

components at issue, and is therefore admissible. LILCO's objection to admission of the FaAA Block Report is addressed above on page 8. LILCO also objects to the first question and answer on page 24 on the "other safety functions of the EDGs" as not adequately relating to the four components in issue. LILCO Motion at 13. This material is clearly introductory and forms the foundation for the following question on requalification of the modified EDGs. It is relevant and material to the adequacy of the EDGs to perform their intended functions as equipped with the replacement crankshafts, cylinder heads, pistons and cylinder blocks. As such, the testimony directly relates to the County's EDG contention and its four subparagraphs.

B. Model AE Pistons (Testimony 25-59)

1. Preliminary Matters (Testimony 25-27)

LILCO's objection to the reference to the FaAA Piston Report is without merit as previously discussed at page 8, supra.

2. Cracking of AE Piston Skirts
(Testimony 27-48)

a. LILCO claims that the Initial FaAA Piston Report referred to on page 27 at footnote 27 should be stricken because it is a preliminary report. LILCO Motion at 13-14. The report, however, was not issued as a preliminary report but as a final report, and was received by the County during discovery as such. The report was revised at a later date in order to take into account an allegedly more refined model. Deposition of David O. Harris (May 8, 1984) at 35-36. Even the allegedly more refined model could only produce a 5 percent improvement in the agreement between the finite element analysis and the experimental results. Testimony at 27. These facts further support the County's testimony that the FaAA analysis of the piston skirts is inadequate. The probative weight to be given these facts is for determination by the Board after cross-examination. Clearly the facts cannot be considered to be devoid of any probative value.

b. LILCO objects to the testimony concerning finite element analysis and the disparity between such analysis and experimental results. This objection is vague and lacks the requisite specificity; LILCO should be required to state precisely what sentences of the Testimony it wants stricken. LILCO

claims the County's witnesses allegedly lack expertise in finite element analysis (LILCO Motion at 14, 19) but LILCO does not support this bald assertion with any facts. In any case, the Testimony does not challenge the results of the finite element analysis as such, but only the conclusions drawn from that analysis. In order to make such comments, a witness need only be familiar with the field of finite element analysis and know the limitations inherent in the analysis to provide testimony on the subject. LILCO does not suggest that the County's experts lack familiarity with the limitations of finite element analysis. LILCO's other objections to this testimony on the ground that it lacks factual support is without merit, as previously discussed at pages 2-3, supra.

c. LILCO also objects to "major portions of the testimony commencing on page 31 and continuing through page 36" as speculative and unsupported. LILCO Motion at 14-15. Again, LILCO's objection is too vague and unspecific to be considered. As for the partial quotations from the Testimony supplied by LILCO, adequate bases for those opinions are given. For example, pages 31 to 34 give numerous reasons why cracks are more likely to initiate in AE pistons than FaAA predicts. LILCO's argumentative objections again incorrectly assume that the County, rather than LILCO, has the burden of proving EDG

reliability. FaAA, as LILCO's consultant, has concluded that the AE piston skirts are entirely adequate. It is clearly relevant and material for the County's witness to testify, in opposing FaAA's conclusion, that FaAA failed to measure such attributes as the gap size between piston and crown and tensile properties, and that such attributes are important to piston reliability. This testimony is not speculative, but is based on stated facts, opinion, and FaAA's own statements as to factors contributing to piston skirt crack initiation, cited in the testimony. LILCO's objections are also without merit for the reasons discussed at pages 2-3, supra.

d. LILCO further claims that the testimony on pages 36 and 37 concerning TDI's casting practices is outside the scope of the admitted contention because such issues were excluded as "independent" issues from this proceeding. LILCO Motion at 16. Again LILCO misconstrues the Board's ruling on separate contentions as it applies to the admissibility of evidence on admitted contentions. The testimony concerning TDI's manufacturing processes is not raised as an independent issue, but relates specifically to the contention that FaAA's fracture mechanics analysis did not consider important actual factors that affect crack propagation in the AE piston skirt: in this case, casting imperfections likely to occur for the reasons stated.

e. LILCO also argues that this testimony on pages 36 and 37, as well as the testimony concerning corrosion products and non-uniform skirt temperatures on pages 37 to 39, and the testimony concerning the inadequacy of FaAA's analysis on pages 39 and 40, should be stricken as speculative and without a factual basis. LILCO Motion at 16. A reading of the challenged testimony demonstrates that, once again, when LILCO disagrees with testimony it simply labels it as "speculative" and attempts to have it stricken. It is clear that the County's opinion testimony on these pages is based upon TDI's inadequate manufacturing processes, the presence of combustion gases that corrode cracks and hasten crack propagation in the skirts, and on various specifically identified factors that FaAA's analysis did not take into account.^{4/} The purpose of this testimony is, properly, to demonstrate that FaAA's conclusions are not to be relied upon because various actual factors were not considered; contrary to LILCO's argument, this testimony is not speculative.

^{4/} LILCO also incorrectly states that no basis is given for the opinion that skirt temperatures are non-uniform. Id. The testimony clearly shows that the opinion is based in part on templug charts provided by TDI that show non-uniform skirt temperatures. Testimony at 38-39.

LILCO's argument that there is an apparent contradiction in certain testimony is irrelevant to the standards for admissibility. LILCO Motion at 17, n.18. In any case, the quoted statements are not contradictory. The witnesses testified that accurate predictions of crack propagation in the AE skirt are impossible (at page 39), and that FaAA's attempt at prediction suffers from numerous flaws which, if corrected, would be improved (at page 40). As the testimony makes clear, while such a prediction would not be accurate, the County's experts would have confidence if the improved analysis were combined with certain experimental testimony, analyses, consideration of design deficiencies, and tests and inspections (at pages 40-41).

f. LILCO claims that the testimony on pages 41 to 46 concerning the inadequacy of the testing and inspection of the AE piston skirt is excluded by the Board's July 5 ruling and July 17 Order rejecting the County's proposed supplement to the piston contention. LILCO Motion at 18-19. This assertion is contradicted directly by the Board's July 17 Order, which expressly states that the County may attempt to prove, "for whatever reasons, whether the Shoreham operating conditions could cause cracking contrary to the analysis [by FaAA]. . . ." (Emphasis in original.) (Id. at 5). For its conclusion that

the AE skirts "are adequate for unlimited life" the FaAA Piston Report expressly relies upon the inspections and field experience discussed in the testimony. See FaAA Piston Report at iii, 7-1, 8-1. Thus, the testimony on pages 41 to 46 is directly relevant to the validity of FaAA's analysis of the adequacy of the piston skirts and hence to the County's EDG contention.

g. Finally, LILCO argues that the testimony on pages 46-48 concerning the effects of crack propagation and a summary of conclusions about AE piston skirt cracking should be stricken because it allegedly is speculative and unsupported by calculations, examples or other authorities. LILCO Motion at 19. The impact of crack propagation is explained adequately. LILCO has totally confused the purpose of this testimony, which does not attempt to prove that cracks will necessarily propagate, but addresses the issue of the tendency for cracks to propagate and, if they do in the AE skirt, the effects on EDG operation. The summary of conclusions is fully supported by the preceding detailed testimony. LILCO's objection is also without merit for the reasons discussed at pages 2-4, supra.

3. Excessive Piston Side Thrust
(Testimony 48-56)

LILCO has moved to strike all of the testimony on pages 48-56 concerning excessive piston side thrust, on the ground that the testimony allegedly is hypothetical, speculative, unsupported by facts and establishes no basis for concluding that excessive side thrust occurs in the EDGs. LILCO Motion at 19-21. LILCO's objection is completely without basis. Although, as we have previously explained, experts need not state the facts underlying their opinions, the testimony clearly states the factual basis for the witnesses' opinions on the existence of excessive piston side thrust. That testimony consists of calculations of excessive side thrust based upon the actual geometry of the skirts in place at Shoreham, actual inspections of wear and distress of the skirts, and conclusions based thereon. The testimony clearly shows the bases upon which the County's expert witnesses believe that excessive piston side thrust exists at Shoreham and the effect of that condition on FaAA's analyses. Any further factual support relied upon by the County's experts can be adduced by LILCO on cross-examination. In addition, contrary to LILCO's assertion (LILCO Motion at 21), the reference on page 56 to excessive side thrust in AE skirts in the TDI R-5 engine or the DSRV-16-4

engine is relevant and within the scope of the admitted contention because, as previously stated, FaAA relies on this operating history of the AE piston skirts for its conclusion that the AE skirts are adequate.

4. Tin Plating of the AE Piston Skirt
(Testimony 56-59)

LILCO argues that portions of the testimony concerning metallurgical aspects of the tin plating process for the AE piston skirts should be stricken as unsupported by facts (LILCO Motion at 21-22), an argument that is without merit as previously discussed at pages 2-3, supra. Moreover, LILCO asserts that because it disagrees with the testimony that there is excessive piston side thrust, that fact cannot be referred to by the testimony. This is not a proper ground to object to the admissibility of evidence. It is for this Board, not LILCO, to determine whether or not the AE pistons demonstrate excessive side thrust. Once again, LILCO is attempting to determine the outcome of a contention by trying to strike testimony with which it disagrees. LILCO also claims (id. at 22) that the conclusion on page 59 of the Testimony should be stricken as unresponsive and unsupported by the testimony preceding it. Contrary to these claims, the testimony in question concludes that the EDG rating exceeds the design limitation of the AE

piston. That testimony refers in part to the prior testimony on page 58 to the effect that the pistons may be tin plated to offset the bad effects of excessive piston side thrust, which is another indication of the over-rating of the EDGs.

C. Replacement Cylinder Heads
(Testimony 59-105)

1. Preliminary Discussion
(Testimony 59-68)

LILCO also generally argues that the testimony on pages 64-67 concerning the original cylinder heads at Shoreham should be stricken as irrelevant. LILCO Motion at 22-23.^{5/} The Board, however, specifically ruled, and LILCO agreed, that the County could refer to "the pre-1981 cylinder head experience in arguing . . . that the new heads of allegedly better quality are in fact no better" (Tr. 21,765, 21,767). The very thrust of the testimony is that the original cylinder heads failed due to flaws in the manufacturing process and that the likelihood of flaws in the replacement cylinder heads has not been demonstrably reduced by the changes in TDI's manufacturing process. (Testimony at 66-67). This testimony is directly

^{5/} LILCO also claims that "several of the conclusions" on pages 62-64 "lack support . . ." LILCO Motion at 22. This objection is vague and incomprehensible, and lacks any basis to respond to it meaningfully.

relevant to Contention 3(a). LILCO's arguments as to the relevancy of this testimony are really directed to the merits of the claims, matters which have to be decided by trial. In addition, the testimony relating to the original cylinder heads at Shoreham provides relevant foundation necessary for a complete administrative record.

2. Inadequate Design
(Testimony 68-76)

a. The same answers apply to LILCO's arguments as to the alleged irrelevancy of the testimony on pages 68-70 relating to "pre-1980" (sic) cylinder heads. LILCO Motion at 23. Clearly, it is relevant to the contention regarding cylinder heads to establish the design differences between the pre-1981 heads and those which succeeded them. Moreover, the EDG contention includes that EDG over-rating is demonstrated by the cracking problems with the cylinder heads; accordingly, testimony contrasting the uprating of the diesels with the lack of changes in head design is relevant and material to this contention. In addition, LILCO argues that the first response on page 71, concerning the consequences of wide variations in firedeck thicknesses, and the final sentence of the response set forth on page 73, concerning the connection between the deflection of the cylinder head and leakage, should be stricken as lacking

factual support. LILCO Motion at 23. This testimony is proper expert opinion testimony. LILCO's argument is without merit, as previously discussed at pages 2-3, supra.

b. Contrary to LILCO's claims (LILCO Motion at 23-24), the reference on page 74 concerning the Owners' Group view that no reliance can be placed on the design analysis in the FaAA Head Report is particularly relevant to the issue of whether the replacement cylinder heads are adequate and reliable. LILCO is a member of the Owners' Group, FaAA is the consultant to LILCO and the Owners' Group, and the belief of the Owners' Group that the FaAA Head Report cannot be relied on is further evidence that the FaAA design analysis is not adequate to assure that the heads are reliable. In essence, this is an admission against interest. And, contrary to LILCO's suggestion (LILCO Motion at 24), this testimony is not an attempt to raise an issue concerning "Owners' Group issues"; rather, it is independent evidence that FaAA's analysis of the replacement cylinder heads is not credible.

3. Changes in Manufacturing Techniques
(Testimony 76-86)

a. LILCO objects to the testimony on pages 76-80 relating to "pre-1980" (sic) cylinder heads as irrelevant and without foundation. LILCO Motion at 24. This argument is without merit as previously discussed at pages 2-3, 25-26, supra. This testimony is directly relevant to paragraph 3(a) of the contention.

b. LILCO also claims that two references on page 84 should be stricken as lacking a "nexus" to Shoreham. These references, to foundry rework on cylinder heads cast in 1982-83 and cracking in stellite weld deposits, however, refute FaAA's conclusion that the changes made to TDI's casting methods and techniques in production of Group III heads (which include the replacement heads at Shoreham) have successfully addressed TDI's casting problems. This testimony is responsive to matters in FaAA's Head Report, upon which LILCO relies.

4. Inspection of Replacement Heads
(Testimony 86-93)

a. Contrary to LILCO's claims (LILCO Motion at 25), the references to TDI's ineffective QA/QC program on pages 90 and 91 are directly relevant to Contention 3(k). It supports

testimony that a sampling inspection of the heads at Shoreham will not detect flaws that are likely to exist and which have not been detected by TDI's QA/QC program.

b. LILCO claims that the testimony on page 93 concerning the lack of inspection criteria is outside the scope of the admitted contention. That testimony is relevant to Contention 3(i), which alleges that an indication exists in a Shoreham replacement head, and to Contention 3(k) regarding inadequate inspections. Moreover, the acceptance criteria are given in an appendix to the FaAA Head Report, upon which LILCO relies, and thus is material to LILCO's claims that inspections have adequately established the absence of cracks in the replacement heads. This testimony is not a challenge to the practices of the Owners' Group, but rather is a challenge to the conclusions drawn by FaAA from the results of cylinder head inspections.

5. Cracks in the Replacement Heads
(Testimony 93-105)

LILCO claims that the testimony on pages 93-105 concerning the effects of cracks in cylinder heads should be stricken because it lacks foundation, is hypothetical and is unsupported by data. LILCO Motion at 25-26. LILCO's objection is simply a collateral attack on Contentions 3(b) - (e). The Board has

already found sufficient foundation to support these contentions, and the testimony provides adequate bases and detail to further support the contentions. LILCO completely mis-states the purpose of this testimony, which is not required to demonstrate that the Shoreham heads will necessarily leak, but rather addresses the relevant contentions.

D. Replacement Crankshafts
(Testimony 106-142)

1. Preliminary Matters
(Testimony 106-108)

The conclusion on page 108 that the replacement crankshafts are not adequately designed is supported by the testimony that follows it, as we show below, contrary to LILCO's claim. LILCO Motion at 26. That testimony is relevant, reliable and speaks for itself. LILCO's objection that "a major portion" of the testimony is irrelevant is vague, incomprehensible and improper.

2. Standards for Crankshaft Design
(Testimony 109-133)

a. LILCO claims that the entire testimony under this heading is irrelevant. LILCO Motion at 26. To the contrary, this testimony is relevant and material to Contention 1(a). It provides necessary foundation, shows that the codes are the

only meaningful standards by which to evaluate the design of the replacement crankshafts other than empirical failures, and explains what code requirements are and how they are not met by the replacement crankshafts. Furthermore, as the testimony shows, the failure of the replacement crankshafts to meet the design criteria of ship classification societies, which are based on years of experience with and operation of diesel engines, demonstrates that the replacement crankshafts are not adequately designed to withstand the stresses to which they are subjected at Shoreham.

LILCO's wholesale attempt to strike all of this testimony is another collateral attack on contentions which LILCO does not like. LILCO's argument is really that the codes are irrelevant (i.e., the crankshaft Contention 1(a) should not have been admitted), therefore the testimony on this contention should not be admitted. This argument is inappropriate and must be rejected.

b. Even the more specific objections by LILCO suffer from this defect. LILCO moves to strike the discussion on pages 113 and 116-117 regarding IACS draft rules as irrelevant (LILCO Motion at 27), even though the IACS standards are specifically part of Contention 1(a), and hence by definition

relevant. Moreover, as the testimony clearly indicates, the IACS rules are being utilized by the other classification societies in assessing the adequacy of the design of crankshafts and are in fact based upon years of experience with diesel engines.

c. LILCO objects to the testimony on pages 120 and 122 concerning the NKK rules and calculations thereunder. Although the NKK rules are not specifically mentioned in the Contention, calculations under those rules are relevant to the witnesses' calculations under the ABS rules showing the inadequacy of the webs on the replacement crankshafts, which form a part of the admitted Contention. LILCO can hardly claim any prejudice as a result of the references to the NKK rules and, in fact, LILCO received copies of the witnesses' calculations under these rules prior to the filing of Testimony. These references are permissible under the strictest rules of pleading and are relevant to the inadequacy of the design of the replacement crankshafts.

The objections stated by LILCO to the County's testimony concerning the German diesel engine standards discussed on pages 120 and 121 are another collateral attack on the Contention. LILCO Motion at 28. The German standards are expressly

within the scope of Contention 1(a). Furthermore, the answer on page 121 is in fact responsive to the question asked and specifically shows that the replacement crankshafts do not meet the German standards used by F.E.V. As previously stated at pages 5-7, supra, LILCO's objections to the use of partial references to the depositions of non-party witnesses lack merit.

d. LILCO's objection to the testimony on pages 125, 126, 132 and 133 as lacking specificity and support is frivolous. That testimony states the conclusion of the County's witnesses that the information submitted by TDI to the ABS is inaccurate and incomplete. That conclusion is particularized and supported by specific references to testimony and documents identified precisely on pages 126-132 of the Testimony.

e. LILCO also objects to the relevancy of the testimony on page 128 concerning the opinion of a Japanese manufacturer of crankshafts as to the lack of benefits from shotpeening. Although the Japanese manufacturer did not supply the particular replacement crankshafts that are installed in the EDGs, that manufacturer supplies TDI with crankshafts of the same design. Furthermore, that manufacturer must be presumed to possess the expertise to comment as to the ineffectiveness of shotpeening a crankshaft the size of those at Shoreham. Thus,

the testimony is relevant to the effectiveness of the shotpeening of the crankshafts at Shoreham.

f. Finally, LILCO claims that the testimony on pages 132-133 as to whether the ABS will reconsider the conclusions stated in the May 3 letter is "speculation." LILCO Motion at 29. The answer, far from being speculative, quotes an ABS official directly. LILCO's alleged "right" to rely on the ABS approval is not at issue, as LILCO alleges. What is at issue is the legitimacy of an approval obtained on the basis of incomplete and inaccurate information.

3. Crankshaft Shotpeening
(Testimony 133-142)

a. LILCO claims, without any factual support, that the discussion on page 138 of the Testimony concerning the existence of residual stress in the crankpin fillets relates to the original crankshafts and therefore is irrelevant. LILCO Motion at 29. Even if this is true, however, FaAA obviously considered the existence of this stress relevant because it considered this fact in concluding that the lower third of the fillet is the most critical area with respect to crankshaft failure. LILCO thus is hard pressed to argue irrelevancy when its own expert considers the fact to be relevant. LILCO's disagreement

with testimony is not a proper ground for barring admissibility. LILCO will have the opportunity at the hearing to challenge factual issues.

b. LILCO also objects to the discussion on pages 138-140 concerning shotpeening photographs as speculative. LILCO Motion at 29-30. The testimony establishes that the County's experts examined these photographs. LILCO's objection is that the photographs discussed are not attached as exhibits. Not only is this objection improper under controlling regulations, but it is also disingenuous. LILCO well knows that it did not provide the County with copies of the photographs until after the Testimony was filed.

E. Cylinder Blocks
(Testimony 143-184)

1. LILCO's objections to the references to the FaAA Block Report and the Task Descriptions (LILCO Motion at 30) are without merit, as discussed at pages 8-9, supra.

2. The question, answer and supporting deposition reference concerning the Colt diesels on page 149 of the Testimony are relevant, contrary to LILCO's claims (LILCO Motion at 30), as foundation and also to show the acceptance criterion used by the Owners' Group for the blocks. LILCO relies upon the DRQR

report on the blocks at Shoreham, and the criterion for adequacy of the blocks is relevant and material to the contention that the EDGs are unreliable because the blocks are cracked.

3. LILCO's objections to the testimony on pages 152 and 153 as speculative and without factual foundation are without merit, as previously discussed at pages 2-3, supra. Once again LILCO misconstrues the subject matter of the testimony. As this testimony makes clear (at page 152), it addresses FaAA's conclusion that ligament cracks are "benign," even though they could leak coolant. It is undisputed that two blocks have ligament cracks. The testimony does not assert that all of the consequences it discusses will necessarily occur; rather, it properly shows what could well occur, and establishes that therefore the EDGs and their blocks are not adequately reliable. This testimony is relevant and material to the EDG contention.

4. The testimony on pages 157 to 159 relating to cylinder block cracking at non-nuclear installations is relevant, contrary to LILCO's claims. LILCO Motion at 31. FaAA relies on this history as evidence that the cracks in the blocks at Shoreham have arrested. See FaAA Block Report at 1-3 and 1-4;

Testimony at 154-57. As such, it is clearly relevant for the County, which challenges FaAA's conclusions as to the blocks, to rebut and discuss this evidence. LILCO's objection once again attempts to exclude testimony on matters upon which FaAA and LILCO rely, and which are relevant to the EDG contention.

5. LILCO moves to strike as irrelevant the sentence accompanying footnote 199 and the reference to Exhibit 64 on page 161, concerning a measurement of liner "proudness". LILCO Motion at 32. These matters are clearly material and relevant. FaAA only measured the liner proudness on the original EDG 103 block; it was shown to vary widely outside TDI's specifications. It is relevant to FaAA's report and conclusions because FaAA assumed the liner proudness in EDGs 101 and 102 are within specification, yet its only evidence was that TDI did not meet specifications in this regard. That the County did not measure the liner proudness on EDGs 101 and 102 is not a proper objection to the relevance of this testimony.

6. Contrary to LILCO's assertion (LILCO Motion at 32), the testimony at the bottom of page 169 and continuing on to page 170 is probative, as it identifies significant information which is relevant to a proper empirical analysis of the blocks, but which is lacking in FaAA's analysis. Similarly, the

testimony on page 173 concerning the fact that accidents such as the "abnormal load excursion" do occur is relevant and probative to an analysis of the adequacy and reliability of the blocks. It clearly shows that LILCO cannot assume that such an event would not occur or cannot happen again. Hence, as the testimony indicates, this event, rather than serving as a possible excuse for crack propagation in the past, is cause for concern in the future.

7. The testimony on pages 178 to 180 concerning other types of cracks in the blocks of TDI engines is relevant and material to the EDG Contention. The cracks are referred to in the FaAA Block Report, upon which LILCO relies. That report applies specifically to all R-4 and RV-4 series cylinder blocks; since the EDG blocks are R-4 blocks, FaAA's report findings are relevant to the reliability of the EDG blocks. Moreover, the cracks in the blocks at Commanche Peak, which FaAA attributes to TDI's casting process, are relevant to show that castings by TDI, including the EDG blocks, are not reliable. In addition, this testimony raises relevant and material concerns about the adequacy and completeness of FaAA's report. LILCO's further objection that the testimony on page 180 concerning the seriousness of circumferential cracks lacks support (LILCO Motion at 33) is without merit, for the reasons previously discussed at pages 2-3, supra.

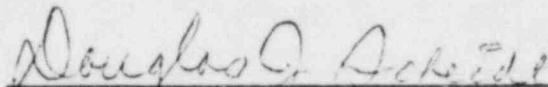
8. LILCO objects to the testimony on pages 183 to 184 for alleged lack of foundation. LILCO Motion at 33. Part of that testimony concerns defects in the casting process as it relates to the blocks. Contrary to LILCO's assertion, and as that testimony clearly states, the testimony is well founded upon the testimony concerning a review of TDI's casting processes and of pertinent documents relating to changes made in those processes. The balance of that testimony sets forth preliminary conclusions on the DRQR report on the blocks, is clearly relevant to the contention concerning the blocks, and constitutes properly supported expert testimony. Should LILCO wish to inquire further into the factual foundation for the opinion testimony, LILCO can do so on cross-examination.

III. CONCLUSION

For the reasons set forth hereinabove, LILCO's Motion to Strike should be denied in its entirety.

Respectfully submitted,

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August 14, 1984

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

DOCKETED
USNRC

Before the Atomic Safety and Licensing Board

'84 AGO 16 P12:30

In the Matter of)
)
LONG ISLAND LIGHTING COMPANY)
)
(Shoreham Nuclear Power Station,)
Unit 1))

OFFICE OF SECRETARY
DOCKETING & SERVICE
Docket No. 50-322 O.L.

CERTIFICATE OF SERVICE

I hereby certify that copies of SUFFOLK COUNTY'S OPPOSITION TO LILCO'S MOTION TO STRIKE PORTIONS OF THE JOINT DIRECT TESTIMONY OF DR. ROBERT N. ANDERSON ET AL., dated August 14, 1984, have been sent to the following by U.S. mail, first class, by hand when indicated by one asterisk, and by Federal Express when indicated by two asterisks.

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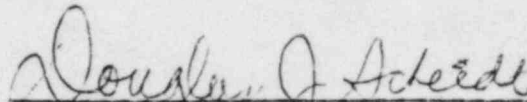
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